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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/522,505	01/26/2005	Hin-Yiu Chung	10808/200	4478

7590 10/06/2008  
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EXAMINER
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HARRISON, MONICA D

ART UNIT	PAPER NUMBER
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2893

MAIL DATE	DELIVERY MODE
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10/06/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/522,505	<b>Applicant(s)</b> CHUNG ET AL.	
	<b>Examiner</b> Monica D. Harrison	<b>Art Unit</b> 2893	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 25 July 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2 and 4-22 is/are pending in the application.
- 4a) Of the above claim(s) 13-17 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 21 and 22 is/are allowed.
- 6) ☒ Claim(s) 1,2,4-12 and 18-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. Applicant's request for continued examination (RCE) filed 7/25/08 has been entered. Examiner acknowledges claim 3 is cancelled, claims 13-17 are withdrawn and newly admitted claims 21 and 22 which have been entered.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 4-10 rejected under 35 U.S.C. 103(a) as being unpatentable over Tokai et al (6,566,199) in view of Okase (5,749,723).

2. Regarding claim 1, Tokai et al discloses a method for oxidizing a layer, comprising the following steps, carried out without restriction in the order indicated: providing a substrate (Figure 14E, reference 81), which bears a layer which is to be oxidized, the layer which is to be oxidized being part of a layer stack which includes the substrate or a base layer at a base surface of the layer which is to be oxidized (Figure 14E, reference 82), and a neighboring layer which adjoins a surface of the layer to be oxidized which is remote from the base surface, and the layer which is to be oxidized being uncovered in an edge region of the layer stack (Figure 14E, reference 83).

However, Tokai et al does not disclose introducing the substrate which bears the layer stack into a holding device; introducing the holding device into a heating device; passing an oxidation gas onto the substrate; heating the substrate to a process temperature, the layer which is

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to be oxidized, as the oxidation time continues, being oxidized ever further from an edge into the layer stack under the influence of the oxidation gas at the process temperature, recording the process temperature during the processing by recording a temperature of the holding device which holds the substrate; and controlling the temperature of the substrate to a predetermined desired temperature or a predetermined desired temperature curve during the processing.

Okase discloses introducing the substrate which bears the layer stack into a holding device (Figure 6, reference 81); introducing the holding device into a heating device (Figure 6, reference 82); passing an oxidation gas onto the substrate (Figure 6, reference 83); heating the substrate to a process temperature, the layer which is to be oxidized, as the oxidation time continues, being oxidized ever further from an edge into the layer stack under the influence of the oxidation gas at the process temperature, recording the process temperature during the processing by recording a temperature of the holding device which holds the substrate (column 5, lines 54-65); and controlling the temperature of the substrate to a predetermined desired temperature or a predetermined desired temperature curve during the processing (Figure 1, reference 33).

It would have been obvious, at the time the invention was made, for one having ordinary skill in the art, to modify Tokai et al with the teachings of Okase, for the purpose of forming a heat treatment apparatus.

3. Regarding claim 4, Okase discloses wherein a heat-up time of the heating device from a start of a heating operation until the process temperature is reached is less than five minutes, the process temperature is between 350°C and 450°C, and at least one of: a temperature of less than 50°C prevails in the heating device at the start of the heating operation, and a

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residence time of the substrate in the heating device is less than fifteen minutes (column 3, lines 66-67 thru column 4, lines 1-13).

4. Regarding claim 5, Okase discloses wherein during the heating of the substrate to the process temperature at least one preheating step is carried out, in which the temperature in the heating device is held at a preheating temperature, which is lower than the process temperature and higher than a condensation temperature of the oxidation gas or a gas which has been admixed with the oxidation gas, for at least ten seconds, and wherein the oxidation gas starts to be admitted to the heating device before the preheating temperature is reached or at the preheating temperature (column 3, lines 64-67 thru column 4, lines 1-42).

5. Regarding claim 6, Tokai et al discloses wherein at least one of the holding devices is covered by a cover and the cover rests on an edge of the holding device or is held at a predetermined distance from the edge (Figure 1).

6. Regarding claim 7, Tokai et al discloses wherein the substrate comprises a circular base surface, and at least one of: the holding device, in a circumferential direction of the substrate, comprises a recess into which a ring is placed, and the heating device includes straight heating elements or spot-like heating elements (Figure 1).

7. Regarding claim 8, Tokai et al discloses wherein the heating device can achieve heating rates of greater than 8°C per second, wherein the layer stack includes a layer whose edge projects beyond the stack, and wherein the heating-up to process temperature is carried out at a heating rate of less than 6°C per second (Figure 1).

8. Regarding claim 9, Tokai et al discloses further comprising interrupting the oxidation before a desired oxidation width is reached; recording an oxidation width; and

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performing a post-oxidation of the layer which is to be oxidized as a function of the recorded oxidation width (Figure 1).

9. Regarding claim 10, Tokai et al discloses wherein the oxidation gas contains oxygen in a form bonded to at least one other element, and wherein the level of molecular oxygen during processing is less than 1% (Figure 1).

Claims 2, 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tokai et al (6,566,199 B2) and Okase (5,749,723) in view of Tsuya et al (4,525,223).

10. Regarding claims 2, 11 and 12, Tokai et al discloses all claimed subject matter (Figure 1) except the substrate consisting of gallium arsenide (claim 2), a thermocouple (claim 11) and a laser unit (claim 12).

Tsuya et al discloses the substrate consisting of gallium arsenide (column 3, line 17), a thermocouple (Figure 1, reference 6) and a laser unit (column 15, lines 59-61).

It would have been obvious, at the time the invention was made, for one having ordinary skill in the art, to modify Tokai et al and Okase, with the teachings of Tsuya et al, for the purpose of manufacturing a thin ribbon wafer of semiconductor material.

Claims 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tokai et al (6,566,199 B2) and Okase (5,749,723) in view of Weaver et al (5,411,763).

11. Tokai et al and Okase disclose all independently claimed subject matter except wherein a thermal conductivity of the holding device at 20°C is greater than  $10 \text{ Wm}^{-1}\text{K}^{-1}$ , and the thermal conductivity of the holding device at the process temperature is greater than a thermal conductivity of the substrate at the process temperature (claim 18) wherein the holding

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device comprises graphite (claim 19), and wherein the holding device comprises at least ninety-percent graphite (claim 20).

Weaver et al discloses wherein a thermal conductivity of the holding device at 20°C is greater than  $10 \text{ Wm}^{-1}\text{K}^{-1}$ , and the thermal conductivity of the holding device at the process temperature is greater than a thermal conductivity of the substrate at the process temperature (column 9, lines 50-65) wherein the holding device comprises graphite (Figure 1, reference 16), and wherein the holding device comprises at least ninety-percent graphite (Figure 1, reference 16).

It would have been obvious, at the time the invention was made, for one having ordinary skill in the art, to modify Tokai et al and Okase with the teachings of Weaver et al, for the purpose of forming a modified ceramic-ceramic composite where graphite is preferred because of its high temperature use capability and its ease of machining.

### ***Response to Arguments***

12. Applicant's arguments filed 7/25/08 have been fully considered but they are not persuasive. Applicant's arguments do not overcome the previous rejection. The previously admitted prior art still reads on the instant application.

13. With respect to claims 1, 4, 5 and 9, Okase discloses a holding device (Figure 6, reference 81; *claim 1*); heating operation (column 3, lines 66-67 thru column 4, lines 1-13; *claim 4*), preheating temperature (column 3, lines 64-67 thru column 4, lines 1-42; *claim 5*) and Tokai discloses interrupting the oxidation (Figure 1; *claim 9*). Again applicant's arguments do not overcome the previous rejection.

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14. With respect to claims 2, 11 and 12, all depend from claim 1. Tokai and Okase still read on instant application of claim 1, which 2, 11 and 12 depend. Applicant's arguments are not persuasive.

15. With respect to claims 18-20, Weaver cures the deficiencies of Tokai in view of Okase because Tokai and Okase still read on the instant application.

***Allowable Subject Matter***

16. Claims 21 and 22 are allowed over the prior art of record.

***Reasons for Allowance***

17. The following is an examiner's statement of reasons for allowance: The prior art does not disclose nor fairly suggest a method of oxidizing a layer which interrupting the heating of the substrate at a second process time, where the second process time is after the first process time; recording an oxidation width of the layer to be oxidized; determining a post-oxidation process time as a function of the recorded oxidation width; reintroducing the holding device into the heating device; reheating the substrate to the process temperature; maintaining the reheated substrate at the process temperature for the post-oxidation process time; and recording the process temperature during the processing and during the post-oxidation by recording a temperature of the holding device as presented in independent claim 21 and in the context of its recited method along with its depending claim.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."



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***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica D. Harrison whose telephone number is (571)272-1959. The examiner can normally be reached on M-F 7:00am-3:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Davienne Monbleau can be reached on 571-272-1945. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Monica D. Harrison/  
Examiner, Art Unit 2893

mdh  
September 25, 2008

/Davienne Monbleau/  
Supervisory Patent Examiner, Art Unit 2893

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